EXPANDING THE SCOPE OF RESTORATION OPPORTUNITIES FOR THE PASSAIC RIVER-NEWARK BAY COMPLEX

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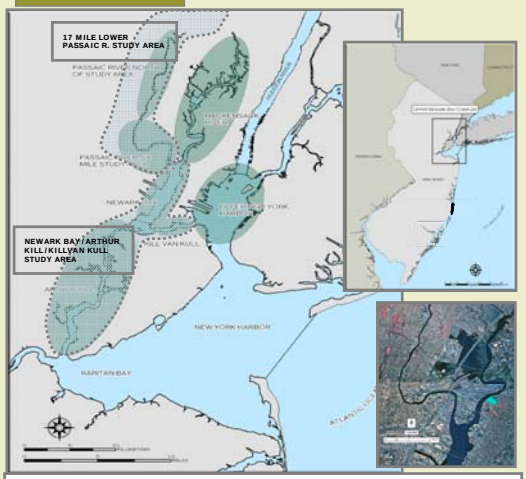
STUDY AREA



New York/New Jersey Harbor Area. Newark Bay Complex includes the tidal Passaic (17 miles between the Dundee Dam and it's confluence with Newark Bay, Hackensack River between Oradell Dam and it's confluence with Newark Bay, Arthur Kill, Kill Van Kull and their tributaries.

ABSTRACT

A broader suite of restoration opportunities is provided by Federal and State natural resource Trustees by extending the geographic scope of the investigation to include areas beyond the 17-mile Lower Passaic Study Area within the Newark Bay Complex. We report on a draft preliminary study conducted by the Trustees of the opportunities found within the larger watershed of Newark Bay, Arthur Kill and Kill Van Kull waterways. We compare these opportunities with those identified in the Lower Passaic River Restoration Project: Preliminary Draft Restoration Opportunities Report. Six criteria were assigned an ordinal scale for the purpose of measuring maximum difference between sites. Sites are assessed for habitat type, proximity to the affected resources, size, connectivity, complexity and existing land use. Results of the comparison demonstrate that the opportunities downstream of the 17-mile area are similar to those in the 17 mile Lower Passaic Study Area in terms of habitat types present, proximity to affected resources and existing land use; but are dissimilar in terms of size, connectivity, complexity and order of dominance of habitat types. Riparian edge dominates the assortment of habitat type found within the 17-mile Study Area, while the Newark Bay/Arthur Kill/Kill Van Kull Study Area is dominated by intertidal wetlands and fringe marshes. Existing uses are dominated by parklands and industrial brownfields in both complexes. The restoration opportunities in the Newark Bay/Arthur Kill/Kill Van Kull Study Area are not substantially larger in size than those found in the 17-mile Study Area. They are more than double in size – but not greater by orders of magnitude as previously had been thought and are more connected to functioning habitats than their counterparts within the 17-mile Study Area. Additional statistical analyses will be discussed.

INTRODUCTION

The Diamond Alkali Superfund Site, located in the highly industrialized city of Newark, New Jersey, is the primary source of dioxin contamination to the Newark Bay Complex (NBC). The Newark Bay Complex, an important economic, ecological and cultural resource, consists of 55 linear miles of waterways, 242 miles of shorelines, and encompasses 17 square miles of water. Over 75 aquatic species utilize the area for feeding, breeding, and nursery habitat. Numerous bird species, including colonial wading birds, also use this area for feeding, breeding, and migratory stopovers. Portions of the complex have been designated significant habitat by the U.S. Fish and Wildlife Service. While the public uses this area for recreational purposes, fish consumption advisories have been in effect since the mid-1980's due to the presence of dioxin, PCBs and chlordane. In addition to providing significant habitat for fisheries, this area supports major shipping and maritime activities. [1,2,3]

The Federal and State partners working on the Lower Passaic River Study Area (PRSA), the EPA, ACOE, NJDOT and the natural resource Trustees (NJDEP, USFWS, and NOAA) have worked to identify potential restoration opportunities within the watershed of the lower 17 miles of the Passaic River (including the Saddle River watershed). [3,4,5] Opportunities have been identified on the Lower Passaic River watershed and its tributaries including subtidal and intertidal areas of the river and riparian areas adjacent to the river, as well as larger contiguous properties and other sites within the watershed. The purpose of the document is to provide critical information in support of the goals of authorizing legislation; the Water Resources Development Act (WRDA) and key legislation (CERCLA) (OPA) that authorizes Natural Resource Damage Assessment (NRDA).

Areas of the greater Passaic drainage were not included under the WRDA authorization and were not considered in the Preliminary Report. These include the main stem of the Passaic watershed above the Dundee Dam, the drainage below the mouth of the Passaic River (PR) in Newark Bay (NB), the Arthur Kill (AK) and the Kill Van Kull (KVK). These areas of the Passaic drainage contain valuable restoration opportunities for consideration under NRDA, which requires that the public be made whole for loss of habitat and lost use in connection with the injuries resulting from exposure to contaminants. It is uncertain that the restoration opportunities identified in the 17 mile study area can adequately compensate for the public loss, and therefore the Trustees have attempted to expand their knowledge base to include opportunities within the effected range of contamination located downstream of the mouth of the PR.

Continuing study of NB, AK and KVK by the Trustees is in accordance with the stated objectives of the Preliminary Draft Report - to provide an overview of the possible restoration sites, including in-river sites, large contiguous properties, tributary sites and other sites within the watershed.

METHODS

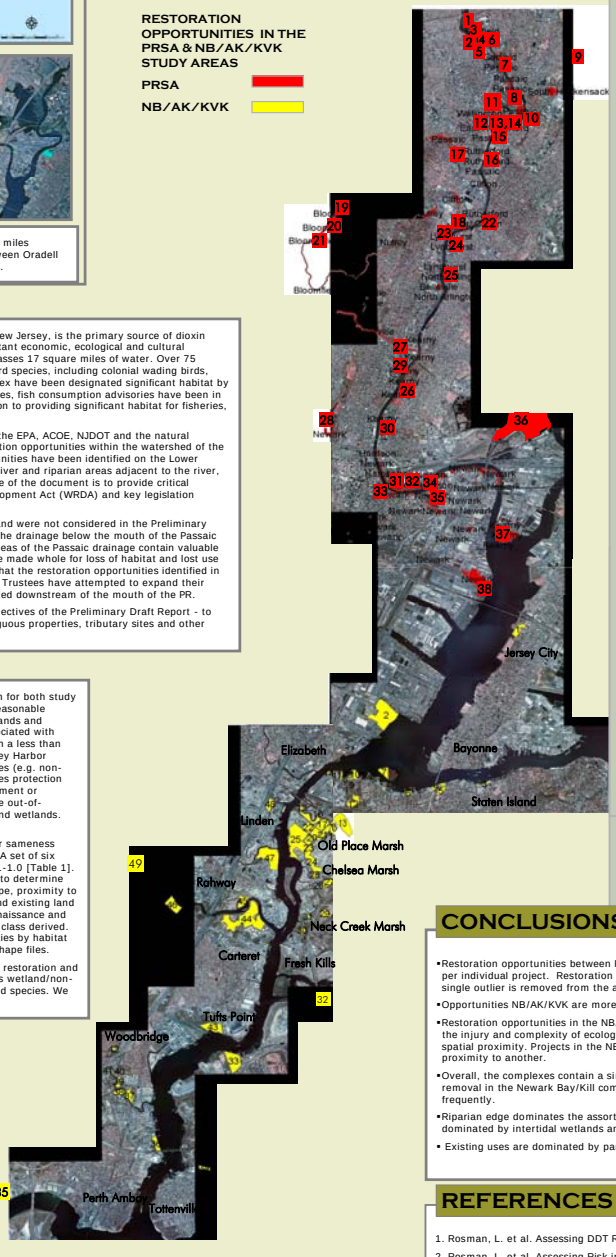
A master database and linked GIS map system was constructed to house the information for both study area data sets. It was necessary to devise an initial early screening to determine what reasonable restoration opportunity existed on site. Although substantial acreage of subtidal bottomlands and intertidal flats are present, opportunity for restoration and enhancement of habitats associated with these features (shellfisheries, submerged aquatic vegetation) is limited or non-existent in a less than two decade history of coastal restoration professional practice in the New York/New Jersey Harbor Estuary. [6] Technical (e.g. demanding physical conditions) and or regulatory infeasibilities (e.g. non-compliance and interference with other uses, such as navigational uses and other fisheries protection initiatives) have limited these opportunities. Proposed projects involving habitat replacement or "taking" of intertidal or subtidal waters have, with few exceptions, been determined to be out-of-compliance with existing statutes, laws and regulatory policy in both NY/NJ waterways and wetlands. Projects suffering insurmountable infeasibilites were removed from the database.

After initial screening, a criteria system was needed to determine maximum difference or sameness between opportunities in the NB/KVK/AK complex and those found in the 17-mile PRSA. A set of six criteria were created and opportunities were assigned an ordinal scale value between 0.1-1.0 [Table 1]. The scoring system is not weighted to determine maximum or best value. It is designed to determine how same or different are the opportunities outside the PRSA. The criteria are habitat type, proximity to the affected resources, size, connectivity, complexity of the existing natural resources and existing land use. Opportunities were identified and site information was obtained through field reconnaissance and desktop exercise using available data. Scores were totaled and averaged in each criteria class derived. Habitat type was assessed for frequency of occurrence (relative abundance of opportunities by habitat type). Total project acreage was based on polygon area coverage derived from ArcGIS shape files.

The database constructed for this purpose became sortable by key categories of habitat, restoration and land use. We were able to summarize the acreage distribution among categories, such as wetland/non-wetland, restored/enhanced, stream miles restored/enhanced, link to injury, and targeted species. We present these here.

TABLE 1. SCALING SYSTEM*

List of Criteria	Definitions	Assigned selections by ordinal scale range of 0.1 - 1.0			
Habitat Class	*Site classification by habitat types ranging from dry to wet*	Upland = 0.1	Freshwater or intertidal wetland = 0.5	Mud/sand flats = 0.5	Submerged lands = 1.0
Proximity	*proximity of site to contamination*	located outside of footprint of contamination linked to Passaic sources = 0.1	located within known extent of contaminants linked to Passaic sources = 1.0		
Size	*magnitude of acres restorable*	less than one acre = 0.1	greater than 1.0 acre and less or equal to 10.0 acres = 0.5	greater than ten acres = 1.0	
Connectivity	*connectivity of site to other natural resource areas*	does not have strong nexus to other major natural resources = 0.1	forms nexus with other identified major natural resources = 1.0		
Complexity	*complexity of existing ecological services*	low complexity - disturbed or extremely low level of ecological services = 0.0	moderate level of complexity - moderate level of ecological services = 0.5	highly diverse level of complexity of ecological services = 1.0	
Existing Condition	*defined as natural value of existing land use*	impervious urban parkland, paved, industrial, brownfield = 0.1	pervious surface, lawn, open soil, gravel, non-paved, over compacted = 0.5	natural area parkland or preserve public land, non-compacted = 1.0	



*Explanation of the Assigned Scaling System: The ordinal scale above has the purpose of relating difference/sameness among individual sites and or aggregates and clusters of sites. The scale determines maximum sameness or difference and does not represent optimum vs. minimum condition or habitat value relative to sites or Study Areas. The system determines whether those sites outside of the PRSA offer a similar set of characteristics of a vastly different sort of opportunity.

RESULTS

TABLE 2

	SUMMARY CRITERIA SCREENING TABLE (SCALING RANGE 0.1-1.0)						
PRSA STUDY AREA	AVG. SIZE	Habitat Class	Proximity to Injury	Size Class	Connectivity Class	Complexity Class	Existing Condition
Average of scores derived from 38 Projects	38.68 ac.	0.3	0.8	0.5	0.3	0.2	0.5
NB/AK/KVK STUDY AREA	AVG. SIZE	Habitat Class	Proximity to Injury	Size Class	Connectivity Class	Complexity Class	Existing Condition
Average of scores derived from 49 Projects	23.6 ac.	0.4	0.9	0.8	0.7	0.2	0.7

TABLE 3

	ACREAGE DISTRIBUTION TABLE				Stream Attributes		
PRSA STUDY AREA	WETLAND ACRES RESTORED	WET ACRES ENHANCED	NON_WET ACRES RESTORED	NON_WET ACRES ENHANCED	DAMS	STREAM MILES Enhanced	ACRES
Sum of Acres	38.3	1061.0	74.3	52.8	Total 3 dams	11.9 mi.	243.7
38 identified projects. Total Restorable Acres 1470.146							
NB/AK/KVK STUDY AREA	WETLAND ACRES RESTORED	WET ACRES ENHANCED	NON_WET ACRES RESTORED	NON_WET ACRES ENHANCED	DAMS	STREAM MILES Enhanced	ACRES
Sum of Acres	320.5	414.2	193.7	188.4	Total 5 dams	5.5 mi.	40.8
49 identified projects. Total Restorable Acres 1157.53							

TABLE 4

DISTIBUTION OF PROJECTS AMONG OTHER KEY CATEGORIES							
LOWER PASSAIC STUDY AREA				NB/AK/KVK STUDY AREA			
LINK TO INJURY	No. of Projects per Type	Div. by	Percent %	LINK TO INJURY	No. of Projects per Type	Div. by	Percent %
Fish_Resources	4	38	11.0	Avian_Resources	7	49	14.0
Mixed_Resources	23	38	61.0	Fish_Resources	1	49	2.0
Recreational Injury	10	38	26.0	Mixed_Resources	37	49	76.0
Water_Quality	1	38	3.0	Recreational_Injury	3	49	6.0
				Sediment	1	49	2.0
RESTORATION CLASS				RESTORATION CLASS			
Enhancement	7	38	18.0	Acquisition_Easement	3	49	6.0
Rehabilitated	1	38	3.0	Creation	1	49	2.0
Restoration	15	38	39.0	Enhancement	18	49	37.0
Restore_Enhancement	4	38	11.0	Remedial	1	49	2.0
Recreational_Services	11	38	29.0	Restoration	22	49	45.0
				Restore_Enhancement	1	49	2.0
				Recreational_Services	3	49	6.0
TARGET SPECIES				TARGET SPECIES			
Human_Recreation	12	38	32.0	Human_Recreation	3	49	6.0
Migratory_fish	3	38	8.0	Migratory_fish	1	49	2.0
Multiple_Species	23	38	61.0	To Be Determined	1	49	2.0
				Multiple Species	44	49	90.0

Results Summary: Table 2 summarizes the results of the screening criteria. There are 38 potential projects within the PRSA and 49 within the NB/KVK/AK. The Avg. Size of the PRSA projects is 38.68 acres, for NB/KVK/AK it is 23.6. The summary results are misleading. One project in the PRSA alone accounts for 1039 acres (Kearny Marsh). Taken without, the avg. size would be reduced to 11.7 acres per site. Total Area: PRSA is 1470.15 acres. NB/KVK/AK is 1157.53. Again, taken without the Kearny Marsh, and the PRSA total area is 431 acres. The Size Class criteria demonstrates the difference clearly. PRSA tends toward projects that are >1.0 and <less that 10.0 acres (score: 0.5). NB/KVK/AK projects tend to be >10.0 acres (score: 0.8). Habitat Class: the PRSA tends towards upland or non-wet (score: 0.3). In the NB/KVK/AK it tends slightly more toward wetland (score: 0.4). Proximity to Injury Class: both study areas show a strong nexus towards the injured area (PRSA: 0.8, NB/KVK/AK: 0.9). Connectivity Class: NB/KVK/AK sites demonstrate a strong connectivity to other natural resources. PRSA projects tend to be isolated from other resource areas (PRSA: 0.3, NB/KVK/AK: 0.7). Complexity Class: neither study area demonstrates a trend towards great complexity or full range of ecological services in the urban environment (PRSA: 0.2, NB/KVK/AK: 0.2). Land Use Class: PRSA sites are characterized by largely permeable surfaces (compacted earth, lawn, gravel) with very few well drained existing natural soils. The NB/KVK/AK contain far more existing natural areas with porous or native soils (PRSA 0.5, NB/KVK/AK: 0.7). Table 4 shows the differences and similarities in the distribution of other key categories for the PRSA and NB/KVK/AK from the master database.

CONCLUSIONS

- Restoration opportunities between PRSA and NB/AK/KVK offer an equivalent total area of coverage and are similar in size per individual project. Restoration opportunities in NB/AK/KVK are larger in size than those found in the PRSA when a single outlier is removed from the analysis.
- Opportunities NB/AK/KVK are more likely to be connected to functioning habitats than their counterparts within the PRSA.
- Restoration opportunities in the NB/AK/KVK are similar to those of the PRSA in terms of habitat classification, proximity to the injury and complexity of ecological services, but are dissimilar for existing land use; connectivity to resources, and spatial proximity. Projects in the NB/AK/KVK are more likely to be a part of an existing significant resource in close spatial proximity to another.
- Overall, the complexes contain a similar array of project types with exceptions: Far more projects require marine debris removal in the Newark Bay/Kill complex. Freshwater riparian projects have been identified in the Passaic Complex more frequently.
- Riparian edge dominates the assortment of habitat types found within the PRSA, while the NB/AK/KVK complex is dominated by intertidal wetlands and fringe marshes.
- Existing uses are dominated by parklands, brownfields and contaminated sites in both Study Areas.

REFERENCES

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